## REMARKS/ARGUMENTS

## I. INTRODUCTION

This application is directed to an elongate electrical connector for use in a versatile track-based power distribution system (or alternatively, a communication distribution system).

Claims 98-117 were pending before entry of this amendment.

In the Office Action:

- claims 98-103 and 112-117 are rejected as anticipated by Walter (4,150,864);
- claim 98 is rejected as anticipated by Sullivan (3,582,864);
- claim 104 is rejected as obvious over Walter in view of Balzano (3,951,497); and
- claims 105-111 are rejected as obvious over Sullivan in view of Walter.

By this amendment:

- claims 99-117 are canceled;
- new claims 118-138 are presented.

Applicants thank the examiner for the Office Action, which has been studied with interest and care. Reconsideration of the application in view of the amendments and remarks contained herein is respectfully requested.

## II. OVERVIEW OF THE CITED PRIOR ART

The cited references deal generally with connectors for interconnecting terminal posts in the context of circuit boards. In overview, they attempt to provide alternatives to the conventional approach of wire wrapping. The general notion is to provide an elongate conductor having a plurality of longitudinally spaced vertical apertures for vertically receiving terminal posts. A force, typically in the form of a resilient bias, is applied to hold each post in a respective aperture, and thereby maintain a mechanical and electrical connection between the terminal posts and the conductor.

Some more specific comments regarding each of the references are provided below.

***Walter:*** This document describes an elongate conductor having pairs of hook-shaped tangs spaced along its length. Each pair is made up of two vertically spaced tangs

having respective aligned vertical openings. These openings define a path into which a contact, in the form of a terminal post, is vertically inserted. The tangs provide a resilient bias to mechanically and electrically connect the post to the conductor.

***Sullivan:*** This document describes an elongate conductor which, borrowing the language of *Walter*, could be said to have single hook-shaped tangs spaced along its length. Again, each tang has an aperture into which a terminal post is vertically inserted, and the tang provides resilient bias that mechanically and electrically connects the post to the conductor

***Balzano:*** This describes a conductor that is quite similar to that of Sullivan, with two primary differences. Firstly, the conductor is, in use, oriented in a vertically opposite manner with respect to a circuit board. Secondly, the tangs are profiled so as to provide an indentation (reference numeral 18) that helps lock in place a terminal post upon vertical insertion.

The conductors disclosed in these references are specifically adapted for a particular common purpose, being electrical and mechanical connection to a plurality vertically extending of spaced apart terminal posts of a circuit board.

## III. OVERVIEW OF SUBJECT APPLICATION

The subject application describes a track-based power distribution arrangement. In overview, such an arrangement provides a conduit that is, in use, mounted (typically horizontally) to a wall in a building. The conduit houses a plurality of conductor members that provide electrical power and, in some cases, communications. The general objective is to provide access to power (and optionally communications) at varying locations along the wall, as opposed to a conventional power socket (which is inherently locked in position). In some embodiments of the invention disclosed in the subject application, a contact assembly provides the general functionality of a conventional power socket, although the assembly is longitudinally movable with respect to the conduit. This contact assembly includes a plurality of electrical

contacts. These contacts are rotationally progressed into respective conductors to provide power (and optionally communications) via the contact assembly.

The present claims are directed towards a conductor for use in a track-based power distribution arrangement, and a conductor member for such an arrangement. The claimed invention provides significant advantages over known products of which the applicants are aware. The claims, as presently amended, clarify this so as to distinguish the claimed invention from the cited references.

## IV. DISTINCTIONS BETWEEN FIELD OF REFERENCES AND FIELD OF INVENTION

Applicants submit that a person designing a conductor member for use in a track-based power distribution arrangement as presently considered would not use as inspiration conductor members used for circuit board terminal post interconnection. Reasons for this include:

- *Length of conductor member.* Although the conductor members described in the cited references are elongate, their length is typically significantly less than those used in track-based power distribution arrangements. In the case of the former, lengths are typically in the order of centimetres, given that the conductor member extends only along the length of a circuit board. However, in the case of the latter, lengths are typically in the order of metres, given that the conductor member extends along the length of the walls of a building. Persons skilled in the art would not be led to consider such inherently short conductor members when designing a significantly longer current carrying conductor member. This also ties in with factors considered below, including spooling, cost, and current carrying capacity.

- *Current carrying capacity.* Terminal post interconnects are intended to carry a relatively small current, typically in the order of milliamps. On the other hand, conductor members in track-based power distribution arrangement must carry a much larger current, typically in the order of Amps (for example 32 Amps for residential 3-phase power). This significantly weighs against a person skilled in the art using the cited references for

inspiration. In particular, devices designed for low current applications are in most cases not suitably adapted for higher current applications.

- *Cost:* To be suitable for use in track-based power distribution arrangements, the cost of conductor members per unit length needs to be significantly lower than is the case with those discussed in the cited references. In designing conductor members as disclosed in the cited references, per unit length costs are less of a factor, allowing for approaches such as that of *Balzano*, where multiple materials are used. Furthermore, given that individual units are relatively short (a few centimetres), unit cost may be sufficiently contained from a commercial perspective in spite of relatively high costs per unit length. A person skilled in the art would appreciate these cost issues, and for that reason not consider conductor members of the nature disclosed in the cited references as inspiration.

- *Clamping Requirements:* At a fundamental level, conductor members of the sort disclosed in the cited references are concerned with clamping a contact that is inserted through an aperture in the conductor member. However, the subject application does not have such a concern, as clamping is sought in absence of an aperture. Underlying notions as to why no such apertures are provided in track-based power distribution arrangements as presently considered are discussed below in the context of orientation and entry position. Furthermore, clamping requirements increase with current, leading to significantly more demanding clamping requirements in high current applications (such as in the context of the subject application).

- *Orientation of contact insertion:* Conductor members of the type disclosed in the cited references are inherently configured to allow vertical insertion of electrical contacts. In fact, such conductor members are unable to deal with anything other than vertical insertion. On the other hand, vertical insertion is generally not an option for track-based power distribution arrangements of the nature presently considered. In particular, vertical insertion inherently requires a significantly larger conduit footprint than is typically preferred. Embodiments of the invention disclosed in the subject application make use of rotational insertion. In particular, a contact rotates from a horizontal position in which it

is out of engagement with the conductor member to a vertical position where it is mechanically and electrically engaged with the conductor member. Applicants submit that a person skilled in the art would not look towards the cited references for inspiration on this basis. Furthermore, even if inspiration were to be taken, the logical conclusion would be to consider options for designing a conduit/contact assembly that permits vertical insertion of contacts.

- *Contact entry position:* It is a fundamental characteristic of conductor members such as those disclosed in the cited references that terminal posts are located at predictable locations (typically evenly spaced along a linear path). The conductor member is then precisely positioned with respect to the posts to allow carefully aligned vertical insertion of multiple posts. On the other hand, the nature of track-based power distribution arrangements is such that the location of contact insertion is variable. In fact, embodiments of the invention disclosed in the subject application allow for insertion to occur substantially anywhere along the length of a conductor member. This is difficult (if not impossible) to achieve by way of a conductor member where a contact must be inserted into a receiving aperture (as in the cited references).

- *Spooling:* Installation of conductor members such as those considered in the cited references is relatively straightforward, in that the conductor member is aligned with respect to the terminal posts and vertically installed. However, installation of a conductor member for a track-based power distribution arrangement requires spooling of the conductor member into the conduit. That is, whereas the cited references deal with linear conductor members that are cut to length (if necessary) and vertically installed, the subject application deals with conductor members that are stored on a cable spool or the like, and fed gradually into the wall-mountable conduit. Conductor members of the sort disclosed in the cited references are inherently unsuitable for such a spooled application. For example, spooling would change the relative positions of apertures thereby inhibiting the ability to align the conductor member with linearly spaced terminal posts.

- *Current transfer characteristics:* The current carrying requirements for conductor members of the sort disclosed in the cited references are altogether different from those in track-based power distribution arrangements, this again weighing significantly against any suggestion that a skilled person might have looked to the cited references fro inspiration. For example, issues such as heat dissipation do not substantively figure into the design of conductor members in the cited references, given that only milliamps need be carried. Such issues become significant at higher currents, as are present in track-based arrangements. Furthermore, in the cited references, current transfer is inherently limited by the size of the aperture into which the terminal post is inserted (and by the size of the pre-existing post itself).

The use of an elongate conductor member in a track-based power distribution arrangement is known. The present invention takes the form of an improved conductor member for such applications. In improving upon known conductor members, the present inventors had three significant objectives:

1) Increasing current carrying capacity.
2) Reducing costs per unit length.
3) Ensuring the conductor member is able to be spooled without difficulty.

With these goals in mind, it would make no sense whatsoever to look towards the sorts of conductor members used to interconnect terminal posts in circuit board applications. These are suited only to carry much lower currents, have a high cost per unit length, and are inherently incapable of being spooled.

## V. COMMENTS REGARDING PATENTABILITY OF AMENDED CLAIM 98

In particular, none of the cited references disclose a conductor for use in a track-based power distribution arrangement wherein conductor members are contained in an elongate insulating conduit. The comments provided in the preceding section highlight some of the significant points of distinction between the field of the cited references and the field of track-based power distribution arrangements.

In particular, claim 98 as amended recites that the conductor includes:

> a longitudinally extending conduit . . . including:
>
> a housing;
>
> a plurality of longitudinally extending and transversely spaced apart channels disposed within the housing, each for captively retaining a respective one of the conductor members, each channel including a respective like facing open end for receiving a respective one of the contacts; and
>
> an elongate longitudinally extending opening for receiving the common electrical contact assembly and allowing the contact assembly to be rotated thereby to progress respective ones of the contacts between the first and second bodies of respective conductor members.

In other words, a conduit contains parallel channels, each channel having a conductor member in it and an opening in the channel. The conduit has one main opening (a main channel) in it that receives the common electrical contact assembly (the contact assembly having two or more separate contacts). The common electrical contact assembly is then rotated, which causes the separate contacts to contact and thereby electrically mate with the individual conductors within the parallel channels of the conduit.

With this structure as recited, a conduit for carrying high voltage and current such as common house current can be mounted on the wall, and individual contact assemblies can be inserted into the main channel at virtually any desired location along the run of the conduit, and the contact assembly rotated to thereby engage all of the contacts (e.g., the 120V hot, the neutral, and the green ground; or alternatively, a first phase, a second phase, and neutral for 240V operation). The structure as recited therefore allows individual power outlets to be easily installed and also easily moved to virtually anywhere along the run of the conduit. See, e.g., page 14, line 29 - page 15, line 6. None of the cited references disclose any such features or advantages.

Limitations have also been introduced in claim 98 relating to the *rotational* progression of a contact. This provides further distinction with respect of the sorts of conductor members present in the prior art, which are only compatible with linear vertical insertion (by virtue of vertical apertures provided for receiving terminal posts). The double aperture approach of *Walter* certainly precludes the possibility of rotational insertion, as does the configuration of regions 17 and 18 in *Balzano*. Although rotational insertion might be geometrically possible in the context of *Sullivan*, the manner by which the clamping operates (particularly by virtue of reliance upon insertion into aperture 26) renders rotational insertion impractical and ineffective. In fact, the very notion of rotational insertion is alien in the context of the sorts of conductor members described in these references, as they are purpose designed to deal with a situation where vertical insertion is the only possibility.

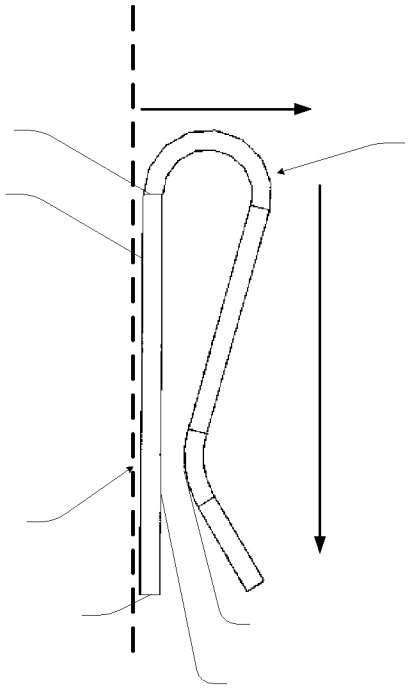
Furthermore, in the present invention, rotational progression results in progression of the contact between the body and a plurality of the ribs. This does not occur in any of the cited references – indeed these references teach away from such a limitation. *Walter*, for instance, teaches benefits in having a pair of vertically spaced apertures to receive a terminal post, and for similar reasons *Balzano* teaches the use of a profiled indentation vertically spaced from a receiving aperture.

It will be appreciated that, although the claim limitation deals with a contact being progressed between the body and a plurality of the ribs, in its final fully rotated position, the contact might ultimately progress to a position where it is between the body and only a single one of the ribs.

The use of non-vertical non-aperture-based insertion (being rotational insertion in the present claims) is significant in terms of increasing current carrying capacity. In the cited references, current transfer is inherently limited by the size of the aperture into which the terminal post is inserted (and by the size of the pre-existing post itself), and therefore limited by rib size (the aperture can not be wider than the rib (tang) in which it is formed. However, in the subject application current transfer is limited by the cross sectional area of the contact. In this manner a wider contact is able to be used (perhaps spanning two or more ribs upon full rotational

progression) thereby to provide current transfer properties in the range of suitable for domestic power distribution applications.

So as to provide some context for the amended language in claim 98, this claim as amended defines a conductor member including a longitudinally extending elongate first body (61 in the drawings). This first body defines a substantially planar contact surface (62 in the drawings) and an opposite face (63 in the drawings) that in some embodiments meet at first and second common edges (64 and 65 in the drawings). The conductor member also includes a longitudinally extending elongate second body, comprising a plurality of ribs (66 in the drawings) in the preferred embodiment. The second body is mounted to the first body and extends transversely away from the first edge and back along substantially all of the planar contact surface. This configuration defines a second contact surface (68 in the drawings, for one of the ribs) that is opposed with the planar surface. It is located intermediate the first and the second edges (64 and 65). Limitations are expressed that the second body does not extend along or transversely beyond the opposite face. Upon rotational progression of the electrical contact between the first and second bodies, the planar and the second surfaces (62 and 66) are resiliently biased into engagement with the contact. For ease of reference, the diagram below schematically illustrates the limitations of claim 1 in terms of a conductor member according to the preferred embodiment, shown in cross-section:




Extends
away fr

As noted at page 1 of the PCT publication, it is a disadvantage of prior art conductor members that they occupy a significant volume. Those skilled in the art will appreciate that this volume deficiency is most apparent when considered in terms of transverse thickness. In particular, conductor members of the sort presently considered are designed to be contained within conduits mounted on walls in buildings for providing access to power (and, in some cases data). From a practical and aesthetic viewpoint, it is particularly advantageous for the conduit to be transversely thin. Given that the thickness of the conductor member or conductor members is inherently a significant limiting factor for the thickness of the conduit, it is important that the conductor members be transversely thin also. It follows that, the problem to be solved by the invention defined in claim 98 is to provide a conductor member having a decreased transverse thickness compared to known conductor members.

**Does not extend along or transversely beyond the opposite face**

Designing a conductor member having a decreased transverse thickness is by no means a trivial affair, particularly given the need to nevertheless provide adequate current carrying characteristics. In particular, it is certainly not as simple as scaling down a known conductor member.

The conductor member defined in claim 98 achieves the goals of a small transverse thickness as a result of combining a substantially planar first body with an appropriately structured second body. In particular, the outer side of the planar first body ("the opposite face") essentially is able to define a first transverse extremity - the second body *does not extend along or transversely beyond the opposite face*. Rather, the second body extends *transversely away from the first edge and back along substantially all of the planar contact surface*, as illustrated above. In this manner, the resilient bias with an inserted contact is essentially provided by the configuration of the second body alone, particularly the upper curved region.

Several of the dependent claims recite a feature whereby, in broad terms, the conductor member includes ribs that are connected at their respective free ends. The Examiner contends that this feature is taught in *Walter*. Applicants disagree, particularly by reference to the limitation in claim 121 whereby the adjacent free ends are mechanically connected *along the length of the conductor member*.

It is acknowledged that, in *Walter*, each "tang" could be viewed as including a pair of ribs interconnected by an integrally formed segment. However, this occurs as a result of the formation of an aperture in each tang, this aperture being for receiving a terminal post. The tangs themselves are not interconnected at their free ends, and *Walter* provides no teaching, suggestion or motivation to do so. Furthermore, in light of the teachings of *Balzano* and *Sullivan,* it would be somewhat counterintuitive to connect the tangs at their free ends to provide a connection *along the length of the conductor member*. Those documents explain the importance associated with the ability to remove individual terminal post connectors (i.e. tangs). For example, item 21 in *Balzano* and item 30 in *Sullivan* show areas where tangs have been removed. Connection of tangs at their free ends along the length of the conductor member

would render such removal difficult. Furthermore, such removal would destroy any connection *along the length of the conductor member*, and eliminate any associated benefit.

Described below are two significant benefits stemming from the connection of ribs at their free ends:

- Increased resilient bias. The contact is biased into engagement not only by the force of directly contacting ribs, but also by adjacent ribs by virtue of rib-to-rib connection.

- Guided progression of a rotationally inserted contact. This is specifically defined in claim 122, which includes a limitation whereby the segments collectively define with the free ends a continuous engagement face along the length of the conductor member for guiding the progression of the contact into biased engagement with the first and second surfaces. The benefits of such a continuous engagement surface are not contemplated in the context of sorts of conductor members described by the cited references, particularly in light of issues such as contact entry position and orientation of contact insertion (discussed further above). Furthermore, without such guided progression, there is an increased likelihood of damage over time from repeated rotational insertion/removal of contacts.

## VI. COMMENTS ON NEW CLAIMS

New claims 118 to 138 have been added. Support for the majority of these claims can be found in the PCT claims as initially filed. Otherwise, the following comments are made:

- Support for new claim 127 can be found at p. 24, lines 2-4.
- Support for new claim 128 can be found at p. 24, lines 3-5.
- Support for new claim 130 can be found at p. 24, lines 13-14.
- Support for new claim 131 can be found at p. 26, lines 13-14.
- Support for new claim 132 can be found at p. 24, lines 10-13.

New claim 137 is somewhat similar to claim 98 discussed in detail above, but further recites the electrical contact assembly itself that is inserted into the conduit and rotated in order to electrically mate it with the conductor members within the conduit. Support for the limitation of the contact assembly is found at, e.g., Figures 1, 2, 3, 5, 23-25, and their accompanying descriptions within the specification (e.g., contact assembly 5, page 11, lines 5 and 9-11

## CONCLUSIONS

In view of the foregoing, it is respectively urged that all of the present claims of the application are patentable and in a condition for allowance. Notice of Allowance is earnestly solicited. The Examiner is authorized to charge any additional fees due, or credit any overpayment, to Deposit Account No. 50-3504.

The undersigned attorney can be reached at 310-317-4466 to facilitate prosecution of this application, if necessary.

Respectfully submitted,

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